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**APPLICATION FOR UNITED STATES LETTERS PATENT**

for

**FRONT-ACCESSIBLE COMMUNICATIONS PORT  
FOR ENCLOSED ELECTRICAL EQUIPMENT**

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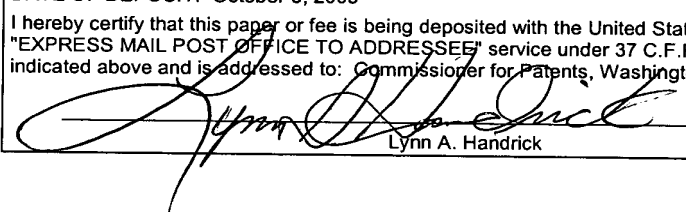
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## **FRONT-ACCESSIBLE COMMUNICATIONS PORT FOR ENCLOSED ELECTRICAL EQUIPMENT**

### **CROSS-REFERENCE TO RELATED APPLICATION**

5           This invention claims the priority of U.S. Provisional Patent Application Serial No. 60/416,612, filed October 7, 2002, for "Front-Accessible Ethernet Port for Enclosed Electrical Equipment."

### **FIELD OF THE INVENTION**

10           This invention is directed generally to network communication access for enclosed electrical equipment, and more particularly to network access for power monitoring/metering and/or control equipment which is housed in an electrical enclosure with live electrical equipment.

### **BACKGROUND OF THE INVENTION**

15           Network communications technology is beginning to be used in enclosed electrical equipment, such as electrical distribution panels, motor control centers and enclosed breakers.

          Ethernet-based devices are typically mounted inside the enclosure, with a  
20   permanent network cable connection to the customer's Local Area Network (LAN). However, such electronic devices are normally designed by engineers most familiar with information technology and not harsh electrical equipment environments. Therefore, often the end-user must open the door to the equipment, or remove a sheet-metal panel, just to access the Ethernet-based device for commissioning or local data transfer.

25           Furthermore, a special "cross-over" Ethernet cable is required between the user's PC and the Ethernet device. The normal network connection must be disconnected to provide the opportunity to make the local (temporary) connection. Then, after the commissioning procedure or data transfer is complete, the permanent network cable must be reconnected, and the equipment door or panel replaced. Equipment manufacturers  
30   recommend equipment be de-energized for servicing; this further complicates the process, since the Ethernet-based device must be powered on during commissioning or

data transfer. To accomplish this safely, the equipment must be de-energized and re-energized only while covers are safely removed and only for that period of time during which the Ethernet-based device must be powered on.

PowerLogic® gateways (e.g., model EGX or ECC made by Square D Company,  
5 the assignee of this invention, as well as some competitive products) provide an Ethernet port for access to web pages representing the equipment. However, these products are typically mounted inside the enclosure, making it necessary to open the equipment door or remove a sheet-metal panel to gain access to the device. Furthermore, a special “cross-over” cable is still required, and this connection requires disconnecting the  
10 permanent network connection temporarily while commissioning takes place.

Power equipment with an embedded Ethernet server may not be so easy to commission. Typical power control and monitoring equipment, such as Square D’s EGX and Power Server™ (PS) require local Ethernet connection to set the IP address. This requires the customer to de-energize equipment (unless server is in a separate  
15 compartment), open equipment door or access-panel, reach in and disconnect Ethernet cable to LAN, re-connect a special “cross-over” cable to EGX or PS, re-energize equipment, set IP address, de-energize equipment again, if needed, remove temporary crossover cable, reconnect permanent Ethernet cable to LAN, close equipment, and re-energize. A better solution is needed to ensure “easy to commission” Ethernet access for  
20 the equipment.

The ECC server is mounted in a CM3000 or CM4000 power monitor (also made by the Square D Company), which can be furnished with a local panel-mounted display. Using this display, the initial commissioning of the server can be accomplished, thus avoiding the safety concerns described above. However, this solution is only cost-  
25 effective if comprehensive metering (the main purpose of this device) is required. Furthermore, this only alleviates the problem with commissioning; this does not provide a solution for local access to data transfer (without interrupting remote operations, opening the enclosure, etc.).

## **OBJECTS OF THE INVENTION**

Accordingly, it is a general object of the invention to provide communication access for power monitoring/metering and/or control equipment housed in an electrical enclosure with live electrical equipment

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## **SUMMARY OF THE INVENTION**

Briefly, in accordance with the foregoing, an electrical equipment enclosure includes an electrical enclosure, electrical equipment in said electrical enclosure, said electrical equipment including one or more devices or electrical systems requiring a communication connection to devices outside of said enclosure, and a communication port mounted to said enclosure and accessible from externally of said enclosure and operatively coupled with said equipment requiring a communication connection inside of said enclosure, for connecting said equipment with equipment outside of said enclosure.

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## **BRIEF DESCRIPTION OF THE DRAWINGS**

The Figure is a simplified diagram showing an Ethernet-based device housed in an electrical enclosure.

## **DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENT**

Power equipment equipped with the technology described herein below avoids all the above-mentioned problems.

A front-accessible Ethernet port allows access for commissioning and subsequent data transfer without opening equipment doors or removing access panels - improving safety and saving time. This port accepts a standard Ethernet cable, since the “crossover” function is accomplished inside the equipment. No special “crossover” cable is required.

Because the equipment can be left energized safely, no time-consuming procedure is needed to de-energize and re-energize the equipment, saving additional time.

Finally, because the permanent network connection remains intact, the front-accessible port allows local data transfer without interfering with remote operations.

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Referring to FIG. 1, an Ethernet-based device 10 (shown here as an Ethernet gateway/web server for other connected devices inside an electrical enclosure 15) is connected to one port of a 4-port industrially-rated Ethernet hub 12, according to one embodiment of the present invention. The hub allows simultaneous connection of a remote Ethernet cable 16 (to customer's LAN) and a front-accessible Ethernet port 14 (for local access for commissioning and data transfer). The front port is an RJ-45 "pass-thru" connector, with standard (RJ-45) Ethernet jacks mounted back-to-back. These connectors, as well as the 4-port hub, are commercially available components, applied in this way uniquely to provide the desired benefits of safety, performance and convenience.

According to another embodiment of the present invention, the Ethernet hub function is incorporated within the Ethernet-based (web server) device 10.

This arrangement allows commissioning of "web-enabled" electrical equipment and access to operating data via an Ethernet network without requiring the equipment to be opened or special cables to be used. The local front port also allows local data transfer to take place without interfering with remote operations.

The invention provides a solution which features a front-accessible Ethernet port 14. A pass-through connector allows easy access to set the IP address. There is no need to open energized equipment to commission the EGX or Power Server or for local access to data transfer. No special "crossover" cable is needed. A connector specially designed for industrial environments may include a tethered cap. To allow multiple Ethernet connections, the hub 12 may be provided inside the equipment.

The front-accessible Ethernet port 14 greatly facilitates commissioning and normal operation. The following outlines a setup procedure:

Verify equipment is connected to active hub on customer LAN.

Get IP address from LAN administrator.

Enter this IP address into equipment (via front-accessible port 14).

Now you're ready to type this IP address into your browser and read your meters.

The front port 14 can also be used to connect to the LAN anytime after commissioning to access data.

According to one illustrative embodiment of the present invention, the communications technology is Ethernet-based and a front-accessible Ethernet port is

used for descriptive purposes herein. According to another embodiment of the present invention, the front-accessible communication port for enclosed electrical equipment is an infrared port. According to yet another embodiment of the present invention, the front-accessible communication port for enclosed electrical equipment is a low power  
5 wireless technology such as 802.11(a, b or g) or Bluetooth.

While particular embodiments and applications of the present invention have been illustrated and described, it is to be understood that the invention is not limited to the precise construction and compositions disclosed herein and that various  
modifications, changes, and variations may be apparent from the foregoing descriptions  
10 without departing from the spirit and scope of the invention as defined in the appended claims.